

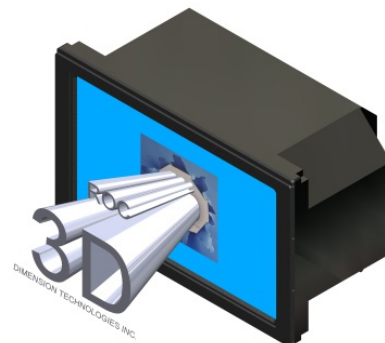
# High Resolution Autostereoscopic Cockpit Display, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



## ABSTRACT

During this Phase II program Dimension Technologies Inc. (DTI) proposes to design and build an autostereoscopic (glasses-free 3D) LCD based aircraft cockpit display that features switchable 2D & 3D operation, full LCD resolution in both 2D and 3D modes, a wide viewing area without head position restrictions, and high brightness. The display will be configured for installation and testing in a Boeing 787 cockpit simulator for evaluation and testing at the end of Phase II. Given positive results this could be followed by modification and installation in a test aircraft in Phase III. The display will be based on Rockwell's 15" flight deck displays currently in use and be designed to fit inside the existing display volume envelope. Code will be written to allow Boeing's existing simulator software to produce 3D images on DTI's displays. Presentation of images in 3D should increase the pilot's ability to extract information, particularly situational awareness from cluttered displays, as indicated by various studies at NASA and the US Air Force. Boeing has agreed to partner with DTI in Phase II.



High Resolution Autostereoscopic Cockpit Display, Phase II

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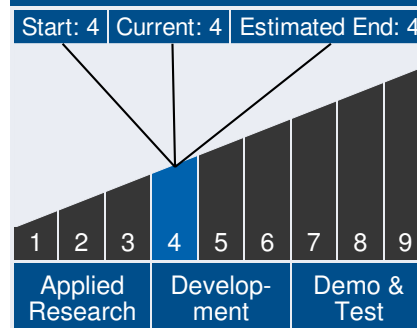
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## ANTICIPATED BENEFITS

### To NASA funded missions:

Potential NASA Commercial Applications: After initial discussions and a meeting with NASA, it was apparent that NASA's interest in this project is primarily for purposes of improving commercial transport aircraft safety, as opposed to any internal NASA project or NASA aircraft or spacecraft. Nevertheless, the technology will potentially be of benefit in NASA aircraft and spacecraft cockpits for purposes of increasing situation awareness, as well as in NASA telerobotic applications, such as the space station based manipulator arm and Robonaut, where display in stereoscopic 3D is of proved benefit for human controlled robot systems. During discussions NASA personnel have also expressed interest in glasses free 3D for workstation applications, especially those that require viewing of complex

## Technology Maturity



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representations of data sets like atmospheric information obtained by satellites. Scientific workstation applications have long been recognized as a potential market for glasses free 3D displays, and therefore is one of the markets that DTI will seek to license into. DTI's strategy is to license to major monitor manufacturers who can commercialize and mass produce 3D displays with DTI technology inside, making them available to NASA and others at low cost for a variety of applications.

## To the commercial space industry:

Potential Non-NASA Commercial Applications: DTI is partnering with Boeing on the Phase II project for development of a prototype glasses free 2D/3D display for testing in their 787 cockpit simulator during Phase II/Phase III, ideally leading to licensing. The display developed under Phase II could have wider application in the avionics industry - a successful Phase III program could result in the opening of other avionics markets. The US Army Tank Command also has an interest in 3D technology for remote controlled vehicle use. An automotive company and a point of sale display company have already expressed interest in DTI's full resolution face tracking display technology. The following long term potential markets have been investigated by DTI: Patient Education - The 150,000 dentists in the U.S. could generate an annual volume of 10,000 3D units. Student Education - Market Research has determined that 3D content yields a 30% higher retention rate than 2D content in an education environment. This could lead to an annual demand for 250,000 3D monitors for each of the following five years. Medical - 3D visualization systems in the operating rooms are estimated to be a \$2 billion market annually, including stereoscopic endoscope systems. Consumer games and Television - The home television market is expected to have great demand for glasses-free 3D. Variations on DTI's face tracked display that could providing 3D to more than one person are a potential solution.

## Management Team

### Program Executives:

- Joseph Grant
- Laguduva Kubendran

### Program Manager:

- Carlos Torrez

### Project Manager:

- Kyle Ellis

### Principal Investigator:

- Jesse Eichenlaub

## Technology Areas

### Primary Technology Area:

Ground and Launch Systems (TA 13)

- └ Operational Life-Cycle (TA 13.1)
  - └ Autonomous Command and Control for Integrated Vehicle and Ground Systems (TA 13.1.3)
    - └ Concurrent Multi-User Three Dimensional (3D) Situational Information Environment (TA 13.1.3.8)

### Secondary Technology Area:

Aeronautics (TA 15)

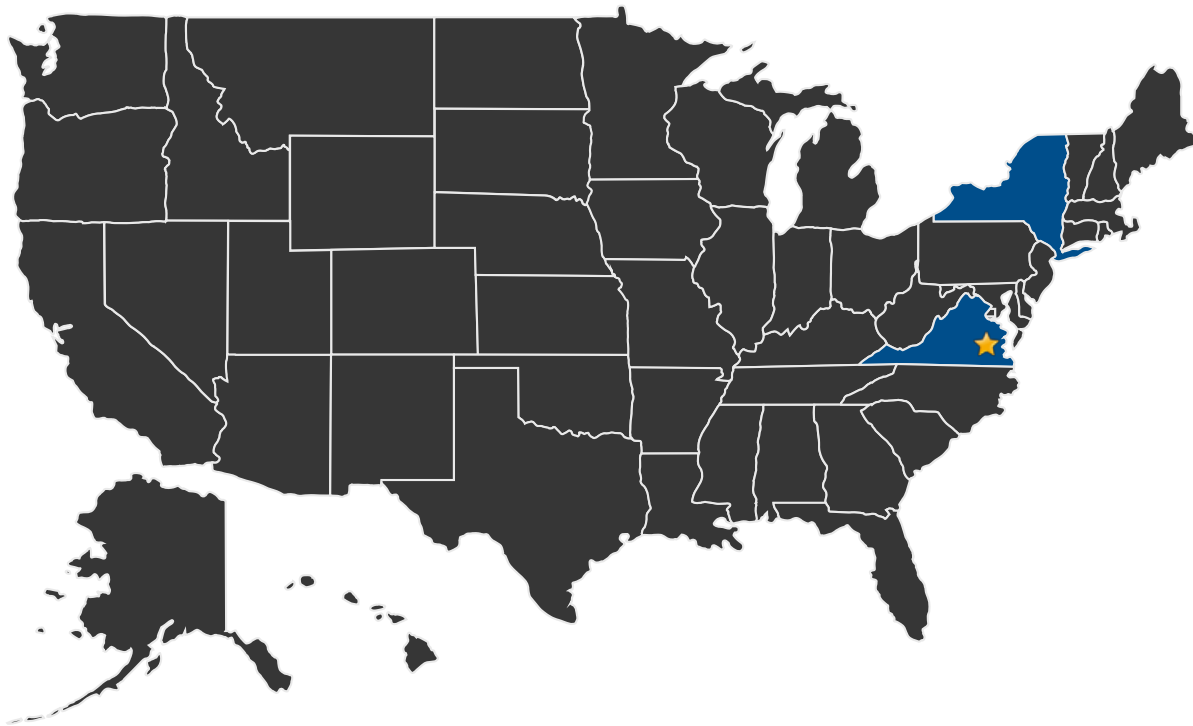
- └ Safe, Efficient, Growth in Global Aviation (TA 15.1)

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## U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States With Work      ★ **Lead Center:**  
Langley Research Center

### Other Organizations Performing Work:

- Dimension Technologies, Inc. (Rochester, NY)

## PROJECT LIBRARY

### Presentations

- Briefing Chart
  - (<http://techport.nasa.gov:80/file/23037>)
- Final Summary Chart
  - (<http://techport.nasa.gov:80/file/23799>)

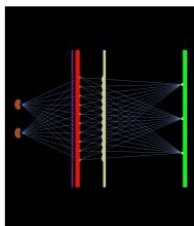
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## IMAGE GALLERY

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*High Resolution Autostereoscopic  
Cockpit Display, Phase II*

## DETAILS FOR TECHNOLOGY 1

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### Technology Title

High Resolution Autostereoscopic Cockpit Display

### Potential Applications

After initial discussions and a meeting with NASA, it was apparent that NASA's interest in this project is primarily for purposes of improving commercial transport aircraft safety, as opposed to any internal NASA project or NASA aircraft or spacecraft. Nevertheless, the technology will potentially be of benefit in NASA aircraft and spacecraft cockpits for purposes of increasing situation awareness, as well as in NASA telerobotic applications, such as the space station based manipulator arm and Robonaut, where display in stereoscopic 3D is of proved benefit for human controlled robot systems. During discussions NASA personnel have also expressed interest in glasses free 3D for workstation applications, especially those that require viewing of complex representations of data sets like atmospheric information obtained by satellites. Scientific workstation applications have long been recognized as a potential market for glasses free 3D displays, and therefore is one of the markets that DTI will seek to license into. DTI's strategy is to license to major monitor manufacturers who can commercialize and mass produce 3D displays with DTI technology inside, making them available to NASA and others at low cost for a variety of applications.